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NEW METHODS IN SOVIET TOOL PRODUCTION INCREASE LABOR PRODUCTIVITY, SAVE METAL

SCIENTIFIC AND PRODUCTION CONFERENCE CONVENES -- Riga, Sovetskaya Latviya, 15 Oct 53

Scientists, engineers, and innovators from Riga, Moscow, Leningrad, Tallin, and other cities will participate in the Riga Scientific and Production Conference which convened on 15 October at the House of Science and Techniques. The conference will last 3 days.

High-speed methods of cutting, electric-spark methods of processing metal, and cold welding of nonferrous metals and iron will be demonstrated at the laboratory of the House of Science and Techniques.

KOLESOV'S TOOL FOR POWER CUTTING IMPROVED -- Moscow, Komsomol'skaya Pravda, 27 Sep 53

Boris Unanov and other workers at the Moscow Plant imeni Pervoye Maya have improved the cutting tool designed by Kolesov [[redacted] for detailed report on Kolesov's tool] by changing its geometrical shape. For example, they eliminated the chip-winding step (porozhek) and the clamped-on chip breaker. This process strengthened the cross section of the hard-alloy cutting tip.

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Chip winding and breakage are now effected by a slope in the face of the tip, along the end cutting edge angle. The intermediate cutting edge (nose), which in Kolesov's cutting tool is disposed at a 20-degree angle [to the axis of the workpiece], has been changed to a nose radius of 0.5 millimeter. The shank of the tool is now mounted at a 30-35 degree angle to the axis of the workpiece and the finishing (zachishchayushchiy) edge is set parallel to this axis. This arrangement has brought the vibration in cutting with large feeds to a minimum and has created favorable conditions for lengthening the life of the cutting-tool edge.

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The machining of a winch shaft 200 millimeters in diameter and 2,950 millimeters long formerly took 19.5 hours; now this operation can be performed in 7 hours with the new tool.

At present, more than 25 operations have been converted to machining with the improved cutting tool. In the majority of these operations, the new tool combines rough, semifinish, and finish machining, thus assuring a high class of surface finish, equal to the 4-6th classes.

The Azinmash (Azerbaydzhan Institute of Petroleum Machine Building) contributed a great deal to the development of the new cutting tool.

Moscow, Komsomol'skaya Pravda, 27 Sep 53

The Collegium of the Ministry of Petroleum Industry USSR has approved Unanov's valuable experiment, and has ordered the managerial personnel of all trusts and enterprises of the ministry to extensively introduce the new tool into production.

Riga, Sovetskaya Latviya, 3 Nov 53

One of the shortcomings of the cutting tool for power cutting designed by Kolesov is that the hard-alloy tip is soldered to the shank. It is difficult to grind this type of tool because, depending on the degree of wear of the cutting edge, it is necessary to grind the surface of the shank together with the tip. The chip-breaking groove also has to be ground each time to conform with the type of job to be done.

Edmund Damberg, a lathe operator at the Riga VEF Plant, has built a cutting tool with ordinary mechanical clamping of the tip. The clamp which holds the tip also serves as a chip breaker. Depending on the type of work to be done, the clamp can be placed at varying distances from the cutting edge.

The new tool was tested by machining a part made of very hard steel at a feed of 2 millimeters (instead of the ordinary 0.2) and at a spindle speed of 2,100 rpm. An operation formerly requiring 50 seconds to perform with an ordinary tool was completed in 4 seconds with the new tool. The cutting speed reached 600 meters per minute.

LARGE FEEDS USED ON MANY MACHINE-TOOL MODELS -- Moscow, Stanki i Instrument, Aug 53

The extensive introduction of Kolesov's method of machining with large feeds is possible both on existing equipment and on new equipment being produced. For example, the Model 162 lathe can operate with feeds up to 4.18 millimeters per revolution; Model 1623, up to 8 millimeters per revolution; and Model 1D63A, up to 2.65 millimeters per revolution.

Models 7231A, 7231, and 7242B planing machines can operate with a feed of 25 millimeters per double stroke of the table; Models 724B, 724A, 7256, and 7242A, with a feed of 50 millimeters; and Models 7278, 7278B, and 7288, with a feed of 100 millimeters.

Models 6N83G and 6N13 horizontal and vertical milling machines have a feed of up to 1,180 millimeters per minute and sufficient power (10 kilowatts) to operate with large feeds per tooth. The Model 6N13B high-speed machine tool presents even greater possibilities in this respect, with a maximum feed of 2,000 millimeters [per minute] and power of 14 kilowatts.

Model 6A54-1 vertical high-speed milling machine can machine large parts with a feed of 1,500 millimeters /per minute/ with a power consumption of 40 kilowatts. All plano-milling machines (Models 661B, 6622, 6632, 6642, 6652, 6662, 6672, and 6682) have a feed exceeding 900 millimeters /per minute/ with a power of from 4.6 to 40 kilowatts.

Certain machine tools in the existing park do not fully meet the requirements for high-production work with large feeds and must be modernized.

The modernization of machine tools, directed toward an increase in feeds with simultaneous increase of power of the main drive, will assure an increase in machine-tool productivity. Sufficient work has not yet been done in this respect.

APPLICATION OF NITRIDING TOOL STEEL -- Moscow, Stanki i Instrument, Sep 53

The process of nitriding steel is finding wide application in Soviet industry for increasing surface hardness, wear resistance, etc., of steel products. At the same time, it would be expedient to transfer the valuable properties obtained by nitriding to cutting tools to lengthen their life, in particular to tools made of carbon or low-alloy steel.

In the regular technological process of heat treating products being nitrided, nitriding is the final operation. However, it is not wise to follow this procedure for hardening cutting tools, because the hardness of a nitrided layer of carbon or low-alloy tool steel directly after nitriding does not assure sufficient durability of the cutting edge.

Research was conducted on three types of tool steels (U12, 9KhS, and KhVG) by nitriding before heat treating for the purpose of increasing the cutting capacities of tools.

The influence of nitriding before hardening on the cutting properties of carbon and low-alloy tool steels was studied by test cutting with experimental tools under laboratory conditions and with special types of tools under shop conditions. The study showed that the cutting properties increased 1.5-3 times. The increase in the cutting properties is expressed not only by a longer tool life but also by an increase in permissible cutting speeds.

Nitrided martensite has a higher capacity for preserving a high hardness at increased temperature than martensite of the same composition but not containing nitride. After hardening, there is no noticeable difference between the center layer and the nitrided layer. After quenching at a temperature of 200-250 degrees, the center becomes less hard than the nitrided layer and, with increased annealing temperature, this difference increases. The capacity to preserve a high hardness at increased temperatures depends to a great extent on the concentration of nitrogen in the solid solution. This is one of the important factors for increasing the cutting properties of tool steels.

Another important factor which contributes to an increase in cutting properties is a change in the wear resistance of steel as a result of nitriding. An increase of 2-5 times in the wear resistance of nitrided martensite as compared with martensite which has not been nitrided contributes considerably to an increase in the cutting properties of a nitrided tool.

The nitriding of carbon and alloy tool steel at a temperature of 550 degrees makes it possible to nitride a layer of sufficient depth as compared with processes of short duration.

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For different tools made from U12, KhVG, and 9KhS steels, different nitriding conditions can be recommended depending on the work conditions and the character of the technological process for manufacturing the tool. Small tools such as small taps and chasers which are not machined (ground or sharpened) after heat treatment must undergo nitriding of short duration (3-6 hours at the nitriding temperature). The duration of nitriding small tools which undergo negligible grinding or lapping after heat treatment can be brought to 10-12 hours.

Tools which require grinding or sharpening after heat treatment and tools which are reground after use must undergo a longer nitriding process. In the majority of cases, the maximum length of the process can be limited to 25-30 hours. A longer process is not desirable since it will not contribute to a longer tool life.

RESTORE WORN TOOLS -- Moscow, Za Ekonomiyu Materialov, Dec 52

The [Moscow Electrical?] Plant imeni Vladimir Il'ich has been restoring worn tools and measuring instruments for several years. The restoration of worn end and slot milling cutters, reamers, cutting tools, calipers, and flat (gladkiy) gauges is now done by reforging, regrinding in a hardened state, and remaking in an annealed form.

A utilizable-waste storeroom has been organized at the Plant imeni Vladimir Il'ich where all worn tools and certain measuring instruments are submitted by tool distribution warehouse machine shops for restoration.

Workers at the Bureau of Technical Inspection sort worn tools and, depending on the type of tool, the material used in its manufacture, and the degree of wear, determine its further disposition.

Tools which are beyond restoration are turned over to the Elektrostal' Plant for remelting. Worn abrasives are sent for restoration to the Leningrad Plant imeni Il'ich. Tools made of alloy steels are turned over to the plant's material resources fund. The hard-alloy blades that cannot be utilized are sent to the [Moscow] Hard-Alloy Combine for reprocessing.

The restored tools are received by the OTK (Division of Technical Control) and if they meet GOST (State All-Union Standard) requirements, they are passed on by invoice to the central tool warehouse. The tools are issued from the warehouse to shops according to the requirements of the shops at the price of new tools.

In addition, with the organization of the utilizable-waste storeroom, a system was set up whereby a new tool can be issued to tool distribution storage shops by the central tool warehouse only in exchange for a worn tool.

This procedure for restoring worn tools made it possible to save in 1951 22 tons of tool steel, or about 126,000 rubles. In addition, labor consumption in manufacturing restored tools as compared with the manufacturing new tools has been reduced up to 20 percent for cutting tools and up to 25 percent for measuring tools.

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